

PCT

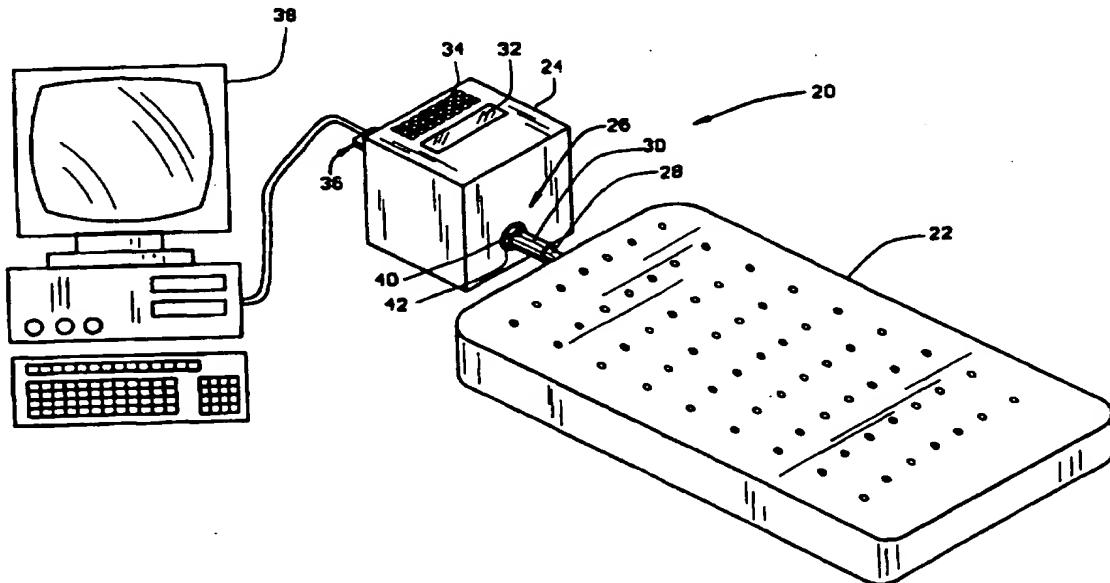
WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : <b>A47C 27/08</b>		A1	(11) International Publication Number: <b>WO 96/14785</b>
(21) International Application Number: <b>PCT/US95/14835</b>		(43) International Publication Date: <b>23 May 1996 (23.05.96)</b>	
(22) International Filing Date: <b>13 November 1995 (13.11.95)</b>		(81) Designated States: <b>AL, AM, AU, BB, BG, BR, BY, CA, CN, CZ, EE, FI, GE, HU, IS, JP, KG, KP, KR, KZ, LK, LR, LT, LV, MD, MG, MK, MN, MX, NO, NZ, PL, RO, RU, SG, SI, SK, TJ, TM, TT, UA, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, LS, MW, SD, SZ, UG).</b>	
(30) Priority Data: <b>08/338,681 14 November 1994 (14.11.94) US</b>			
(71) Applicant: <b>LAKE MEDICAL PRODUCTS, INC. [US/US]; 11445 Moog Drive, St. Louis, MO 63146 (US).</b>		(72) Inventors: <b>KLEARMAN, Jeffrey, D.; Frontenac Place #2, St. Louis, MO 63131 (US). BRONSON, Robert; 4062 Loughborough, St. Louis, MO 63116 (US). ROTH, Jerry; 6849 Big Creek Drive, House Springs, MO 63051 (US).</b>	<b>Published</b> <i>With international search report.</i> <i>With amended claims and statement.</i>
(74) Agents: <b>HAFERKAMP, R. et al.; Rogers, Howell &amp; Haferkamp, L.C., Suite 1400, 7733 Forsyth Boulevard, St. Louis, MO 63105-1817 (US).</b>			

(54) Title: **BED SYSTEM HAVING PROGRAMMABLE AIR PUMP WITH ELECTRICALLY INTERLOCKING CONNECTORS**



(57) Abstract

A bed system (20) is provided which limits the inflation time of each of a plurality of ventilating air mattresses (22) with the system (20) to a predetermined time. Each mattress (22) includes a fitting (30) with a spring biased pin (48) for actuating a pump switch (56) when the mattress fitting (30) is properly mated with a pump adapter (40) thereby facilitating inflation of said mattress. The pump (24) is programmed to deactivate at the predetermined time, and to remain deactivate until the pump switch (56) is reset. The pin (48) is positioned and constructed to be mechanically rendered inoperable in the process of resetting the switch (56) thereby preventing each mattress fitting (30) from actuating the pump switch (56) a second time.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Larvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

**BED SYSTEM HAVING PROGRAMMABLE AIR PUMP  
WITH ELECTRICALLY INTERLOCKING CONNECTORS**

**Background and Summary of the Invention**

Ventilating air mattresses have been developed and are used in the medical field to minimize bed sores and blisters experienced by people confined to bed for 5 extended lengths of time. These mattresses are inflated with pressurized air from a pump connected through an aperture and have a plurality of pores through their top surface allowing a controlled flow of air therethrough. The ventilating air mattresses distribute the support of 10 a patient over a greater area of the patient's body (when compared to conventional mattresses) thereby relieving pressure in areas of bone protuberances which are highly susceptible to bed sores. The controlled air flow also assists in drying moisture which aggravates the bed sore 15 problem.

Due in part to the success of these ventilating air mattresses in minimizing bed sores, health-care facilities with one or more of these mattresses keep them in near constant use. Once a patient assigned to a 20 ventilating air mattress departs a hospital or other

health-care facility, the ventilating air mattress is quickly sterilized and used with another patient. Several problems have arisen from the propensity to continuously use these mattresses. First, to withstand the magnitude of use to which these mattresses are typically subjected requires highly durable materials. This is particularly true for the top porous sheet, the seams, and the pump/mattress connection. A typical prior art ventilating air mattress is constructed of 200 denier nylon and is specially sealed to assure reliability. The expense of these materials and the associated construction costs inflate the unit cost of each bed. Moreover, and perhaps more importantly, the continuous use of the prior art mattresses with multiple patients leads to a risk of cross-contamination. Body fluids routinely soil the mattress covers and other bedding materials and, with extended use, the mattresses themselves may absorb contaminants and become soiled or stained by undesirable residue. Because it is difficult and time consuming, and therefore expensive to properly sterilize these mattresses, a tight financial climate may tempt hospital/health-care personnel to cut costs and save time by cleaning and not sterilizing these mattresses between uses. This practice significantly increases the risk of cross-contamination. A related problem is the accumulation of fluids, residue, and other contaminants within the mattress pores which may eventually clog these air passages. This again poses a cross-contamination concern and hinders the primary functions of the ventilating air mattress -- relieving pressure in areas of bone protuberances and assisting in drying moisture which often aggravates the bed sore problem.

In order to solve these and other problems in the prior art, the inventors herein have succeeded in designing and developing a ventilating air mattress bed

system which includes a two piece single use connector with electrical interlock for connection of a ventilating air mattress to a programmable air pump. The programmable air pump is electrically connected to the 5 electrical interlock which is actuated upon connection of the ventilating air mattress to thereby enable the programmable air pump. The programmable air pump then inflates the air mattress for a predetermined time period or a predetermined duty cycle. At the end of that 10 predetermined time period or duty cycle, the pump is programmed to turn itself off and will not recycle for another operation until the interlock is reset. As the connector between the ventilating air mattress and pump is a single use connector, and is designed to become 15 mechanically inoperable upon disconnection, the same ventilating air mattress may not be simply disconnected and reconnected for a second duty cycle. Instead, once the ventilating air mattress connection is disconnected, it is no longer capable of reactivating the electrical 20 interlock and a new ventilating air mattress with an unused connector must be reconnected.

The single use connector with electrical interlock is designed as a two-piece connector with the electrical switch portion being permanently mounted on the 25 programmable pump and the inexpensive mechanical actuator portion being mounted on each ventilating air mattress. This mechanical actuator portion on the ventilating air mattress piece is mechanically damaged upon disconnection so as to render it inoperable, but the electrical switch 30 portion on the programmable pump remains intact. Consequently, the replaceable ventilating air mattress and connector portion are relatively inexpensive, mechanical pieces, which facilitate their ready replacement.

Thus, the present invention is a significant improvement over the prior art by providing a system which limits the risk of cross-contamination associated with the continuous use of a single mattress in the prior art. Moreover, the materials and manufacturing costs necessary for this limited use mattress are small in comparison to the prior art ventilating air mattresses, and, due to its elegantly simple design and construction, the single use connector and programmable pump of this invention are easily used without significant training. While the principal advantages and features of the present invention are briefly described above, a more thorough understanding and appreciation for the advantages and features of the invention may be obtained by referring to the drawings and descriptions of the preferred embodiments which follow.

Brief Description of the Drawings

Figure 1 is an isometric view of a bed system of the present invention showing a ventilating air mattress and corresponding mattress fitting, an air pump with an adapter housed therein, and an optional remote computer connection;

Figure 2 is a side elevation view of the mattress fitting and the pump adapter, for illustrative purposes the adapter is shown without the pump housing in Figures 2, 3, and 5-9;

Figure 3 is a front view of the pump adapter;

Figure 4 is a front view of the mattress fitting;

Figure 5 is an isometric view of the connector showing the spring biased pin of the fitting aligned with the adapter ramp;

Figure 6 is a side elevation view of the connector showing the fitting and adapter properly mated with the fitting pegs inserted to the ends of the adapter J-shaped slots;

Figure 7 is a cross-sectional view of the connector of the present invention further illustrating the relationship between the spring biased pin and the switch when the fitting and adapter are properly mated;

5 Figure 8 is a cross-sectional view of the connector illustrating the relationship between the mattress fitting pin and the pump switch when the fitting pegs are only advanced to the turn in the adapter J-shaped slots; and

10 Figure 9 is a cross-sectional view taken along lines 9-9 in Figure 6 illustrating the relationship between the mattress fitting pin and the pump switch when the fitting pegs are fully advanced to the ends of the adapter J-shaped slots.

15 Detailed Description of the Preferred Embodiment

A bed system constructed according to the principles of the present invention, which limits the operability of an air mattress with the bed system, is illustrated generally as 20 in Figure 1. The system 20 includes a plurality of substantial identical ventilating air mattresses 22 (only one is shown), a programmable air pump 24, and a single use connector 26 between the pump 24 and one of the mattresses 22. The ventilating air mattress 22 has a tube 28 extending therefrom and a fitting 30 at the end of the tube. The programmable pump 24 preferably includes a Windjammer blower manufactured by Ametek, a display 32, a keyboard 34 or other data entry means, a communication jack 36 for linking the pump 24 with a remote input/output terminal 38, and an adapter 30 40 within the pump housing extending through to an aperture 42 therein.

The single use connector 26 includes the mattress fitting 30 and the pump adapter 40 (See figure 2). The fitting 30 is preferably tubular with two pegs 44 extending radially therefrom and an aperture 46 extending through the fitting 30. A pin 48 extends through the

aperture 46 and is connected near the end of a spring latch 50. The spring latch 50 biases the pin 48 in a first position such that part of the pin extends beyond the exterior circumference of the fitting 30 (See Figures 5 2 and 4). In the preferred embodiment, the spring latch 50 is sufficiently compliant to allow the pin 48 to retract flush with the fitting exterior circumference upon application of a moderate force, and sufficiently resilient to return the pin 48 to the first position upon 10 removal of the force.

The adapter 40 is preferably tubular with an interior circumference slightly larger than the exterior circumference of the mattress fitting 30 such that the fitting 30 and adapter 40 are in sliding engagement when 15 the fitting is inserted into the adapter. Two J-shaped slots 52 and a ramped surface 54 are located at the front end of the adapter 46. (See Figures 3 and 5) An electrical interlock switch 56 is mounted to the adapter 40 and is electrically connected to the blower of pump 20 24. The switch 56 includes an arm 58 which extends into an adapter aperture 60 and is biased by a spring 62 such that the arm 58 is approximately flush with the interior circumference of the adapter 40. Preferably, the spring 62 is sufficiently compliant to allow the arm 58 to be 25 pushed into the switch with the force generated by the spring latch 50, thereby actuating the switch. (See Figure 9)

In operation, one of the plurality of ventilating air mattresses 22 is selected and the corresponding 30 fitting 30 is positioned relative to the pump adapter 40 such that the fitting pegs 44 and pin 48 align with the adapter J-shape slots 52 and ramp 54, respectively. (See Figure 5) In the preferred embodiment, the two pegs 44, and the corresponding J-shaped slots 52, are positioned 35 at other than 180° (See Figures 3 and 4) thereby defining a single proper alignment between the fitting 30 and the

adapter 40. As the fitting 30 is pushed into the adapter 40, the pin 48 slides up the ramp 54 which retracts it from its first position to a position flush with the interior circumference of the adapter 40. The fitting 5 aperture 46 and adapter aperture 60 are positioned to align with one another when the fitting 30 is pushed into the adapter 40 and twisted thereby locating the pegs 44 at the ends of the J-shaped slots 52. When the apertures 46 and 60 align, the spring latch 50 returns the pin 48 10 to its first position thereby pushing the pin into the adapter aperture 60 and engaging the switch arm 58. In the preferred embodiment, the spring latch 50 is sufficiently resilient and the switch spring 62 is sufficiently compliant such that the pin 48 pushes the 15 arm 58 into the switch 56 thereby actuating the switch.

The pump 24 is programmed via the keyboard 34 or the remote input/output terminal 38, to operate for a predetermined length of time and then deactivate until the adapter switch 56 is reset. As used herein 20 "predetermined time" shall refer to a set number of total hours of pump activation (i.e. 15, 30, 90 hours of operation), a set number of chronological hours (i.e. 30, 90, 180 hours from the moment the pump is activated with a given mattress), a set time and date in the future 25 (i.e. first Monday of each month at 8:00 a.m.), and/or a set number of times the pump is manually turned off (i.e. the pump deactivates upon being manually turned off three times thereby controlling the number of times a given mattress is reused). Other predetermined times may be 30 selected and are limited only by the program capability of pump 24. However, predetermined time as used herein is not intended to encompass a time frame equal to or greater than the useful life of a typical ventilating air mattress as measured by material failure due to normal 35 wear and tear. When the timing command is properly entered into the pump 24 and the switch 56 is actuated,

the pump 24 commences operation thereby inflating the ventilating air mattress 22. In the preferred embodiment, a message is produced on the display 32 or the input/output terminal 38, to alert hospital personnel

5 approximately eight hours prior to the programmed pump deactivation time. At the predetermined time, the pump deactivates thereby causing the ventilating air mattress 22 to deflate and prohibiting reactivation until the switch 56 is reset. Resetting the switch 56 requires the

10 arm 58 to be released to its original position and then pushed back into the switch 56.

In the preferred embodiment, because the adapter is located within the pump housing and the spring latch 50 is mounted on the interior of the mattress fitting 30,

15 the pin 48 and switch arm 58 are not easily accessible when the fitting and adapter are properly mated. Thus, returning the arm 58 to its original position (in order to reset the switch) requires removing the pin 48 from the adapter aperture 60 by misaligning the fitting

20 aperture 46 and the adapter aperture 60. As illustrated in Figure 9, the pin 48 is positioned well into the adapter aperture 60 when the fitting and adapter are properly mated. As the mattress fitting 30 is rotated with respect to the pump adapter 40 to mechanically

25 separate them, the pin 48/spring 50 are mechanically interfering to thereby be damaged and rendered inoperable. This can happen in one of several ways, depending upon the particular design chosen. For example, pin 48 may be designed and constructed of such

30 materials such that it is sheared. Alternately, the spring 50 connection to the mattress fitting 30 may break away to permit pin 48 and spring 50 to remain intact but drop out of aperture 60 and thereby permit continued relative rotation between mattress fitting 30 and adapter

35 40. In still another alternative design, pin 48 may itself break away from spring 50. Any one of these

alternatives is considered to be adequate to render the mattress fitting 30 inoperable for subsequent reconnection and reuse of the same ventilating air mattress. Because the fittings 30 are not easily 5 interchangeable, the present invention assures that the first ventilating air mattress 22 is not utilized by the system beyond the predetermined time period programmed in the pump 24.

In the preferred embodiment, the pump 24 includes 10 a lithium battery to provide non-volatile memory of the pump logic stage even in the event of a power outage or an operator attempting to circumvent the pump logic by unplugging the system. Moreover, the communication jack 36 and remote input/output terminal 38 allow the system 15 20 to be controlled at a central station or off site if desired.

In its use, the bed system of the present invention is elegantly simple and provides significant advantages over the prior art. The method of using the 20 bed system is also novel and unique and includes the steps of selecting a first of the ventilating air mattress 22 and properly mating the mattress fitting 30 with the pump adapter 40 thereby facilitating inflation of the mattress, and automatically disabling the first 25 mattress for use with the bed system upon a predetermined time. As used herein, "disable" shall mean prohibiting the mattress from operating as a ventilating air mattress with the bed system 20 and includes: (1) facilitating deflation of the mattress if the mattress is inflated; 30 and (2) inhibiting reinflation of the mattress by the system. The air pump 24 is programmed to deactivate after the predetermined time and will not reactivate until the adapter switch 56 is reset. The step of resetting the switch 56 damages the mechanical actuator 35 comprised of pin 48 and spring 50 associated with the first mattress fitting 30 rendering the mattress fitting

nonfunctional to actuate the switch 56 a second time. Because the fittings 30 and mattresses 22 are not easily interchangeable or repairable, this procedure effectively disables each mattress after the predetermined time.

- 5        While the preferred embodiment describes a bed system 20 incorporating a full-length ventilating air mattress 22, it is understood that the mattress may comprise a number of modular sections without departing from the scope of this invention. Moreover, there are
- 10      various other changes and modifications which may be made to the invention as would be apparent to those skilled in the art. However, these changes or modifications are included in the teaching of the disclosure, and it is intended that the invention be limited only by the scope
- 15      of the claims appended hereto.

What Is Claimed Is

1. An air bed system comprising an air pump, a connector between the pump and an air mattress to thereby inflate the mattress, and means for automatically disabling the mattress for use by the system after a 5 predetermined time.
2. The bed system of Claim 1 wherein the automatic disabling means includes means for automatically deflating and inhibiting reinflation of said mattress after said predetermined time.
3. The bed system of Claim 2 wherein said connector includes a pump adapter mated with a mattress fitting.
4. The bed system of Claim 3 wherein the adapter includes a switch for enabling the pump and the mattress fitting includes means for actuating said switch when the fitting and adapter are properly mated.
5. The bed system of Claim 4 wherein the switch actuating means includes a spring loaded pin which is rendered inoperable upon disconnection of said connector.
6. The bed system of Claim 5 wherein said air mattress is a ventilating air mattress.
7. A programmable air mattress system for limiting the inflation time of an air mattress to a single use comprising an air mattress, a programmable air pump and a single use connector for connecting said air 5 mattress to said air pump so that said air mattress is capable of operable connection to said air pump for only said single use.
8. The programmable air mattress system of Claim 7 wherein said single use connector includes an air mattress fitting secured to said air mattress and an adapter connected to said pump.
9. The programmable air mattress system of Claim 8 wherein said single use connector includes a mechanical actuator and wherein said mechanical actuator is

physically rendered inoperable upon separation of said fitting from said adapter to thereby prevent operable reconnection of said single use connector.

10. The programmable air mattress system of Claim 9 wherein said single use connector further comprises an electrical switch, said electrical switch being electrically connected to said pump, and said mechanical actuator having means for operating said electrical switch upon connection of said fitting to said adapter to thereby indicate said connection to said pump.

11. The programmable air mattress system of Claim 10 wherein said electrical switch is mounted to said adapter and said mechanical actuator is mounted to said fitting.

12. The programmable air mattress system of Claim 11 wherein said single use connector includes a mechanical interlock to securely fasten said fitting to said adapter.

13. The programmable air mattress system of Claim 12 wherein said mechanical interlock includes at least one J-shaped slot on one of said fitting or adapter and a matching peg on the other of said fitting or adapter.

14. The programmable air mattress system of Claim 13 wherein said fitting and adapter each include an orifice which align with each other as said single use connector is connected.

15. The programmable air mattress system of Claim 14 wherein said mechanical actuator includes a spring loaded pin extending through said fitting orifice.

16. The programmable air mattress system of Claim 14 wherein said adaptor includes a ramp for depressing said spring loaded pin as said single use connector is connected.

17. The programmable air mattress system of Claim 16 wherein said electrical switch is aligned with said adapter orifice so that as said orifices become aligned

5 by connecting said single use connector, said spring loaded pin extends into said adapter orifice to actuate said electrical switch.

18. The programmable air mattress system of Claim 17 wherein said pin is positioned to extend sufficiently into said adapter orifice as said single use connector is connected to thereby mechanically interfere with 5 disconnection of said single use connector.

19. A ventilating air mattress for use in a bed system, said air mattress including a fitting comprising a part of a single use connector so that upon disconnection of said mattress fitting from said bed 5 system, said mattress is incapable of operable re-connection thereto.

20. The ventilating air mattress of Claim 19 wherein said mattress fitting includes a mechanical actuator and wherein disconnection of said fitting from said bed system physically renders said mechanical 5 actuator inoperable.

21. The ventilating air mattress of Claim 20 wherein said mattress fitting further comprises a mechanical interlock to securely fasten said fitting to said bed system.

22. The programmable air mattress system of Claim 21 wherein said mechanical interlock includes at least one J-shaped slot on one of said fitting or adapter and a matching peg on the other of said fitting or adapter.

23. The programmable air mattress system of Claim 20 wherein said mechanical actuator includes a spring loaded pin extending through an orifice in said fitting.

24. A method of limiting the inflation of an air mattress within a bed system to a predetermined time, the method comprising the steps of:

5 inflating said mattress with an air pump; and automatically disabling said air mattress at the predetermined time.

25. The method according to Claim 24 wherein the disabling step includes the steps of automatically deflating said mattress and of inhibiting reinflation of the mattress by the system after said predetermined time.

26. The method according to Claim 25 wherein the pump includes a switch to enable activation thereof, and wherein the step of inhibiting reinflation of the mattress includes the step of programming said pump to remain deactive until the switch is reset.

27. The method according to Claim 26 wherein the mattress includes means for actuating the switch and the step of resetting the switch includes the step of rendering the actuating means inoperative.

## AMENDED CLAIMS

[received by the International Bureau on 26 April 1996 (26.04.1996);  
original claims 2, 3, 8 and 11 cancelled;  
original claims 1, 4-7, 9, 10 and 12-27 amended;  
new claims 28-35 added (7 pages)]

1. An air bed system comprising:

an inflatable air mattress;

an air pump;

a first connector operatively attached to the pump

5 and having a fluid passageway therein in fluid communication with the pump;

a second connector attached to the air mattress

and having a fluid passageway therein in fluid

communication with an interior of the mattress, the

10 second connector being configured for connection to the first connector for facilitating inflation of the air mattress by the pump; and

an electronic circuit configured for deactivating the pump after a predetermined time and for thereafter

15 inhibiting reactivation of the pump until after disconnection of the second connector from the first connector.

4. The bed system of Claim 1 wherein the first connector includes a switch for enabling the pump, and wherein the second connector includes a switch actuating portion for actuating said switch when the first and

5 second connectors are connected together.

5. The bed system of Claim 4 wherein the switch actuating portion of the second connector engages a disabling portion of the first connector during disconnection of the first and second connectors, said 5 switch actuating portion and said disabling portion being configured such that the engagement of the switch actuating portion by said disabling portion during disconnection of the first and second connectors renders the switch actuating portion inoperable to actuate the switch even upon reattachment of the first and second

10 connectors.

6. The bed system of Claim 1 wherein said air mattress is a ventilating air mattress.

7. A programmable air mattress system comprising:  
an air mattress;  
a programmable air pump;  
a first connector operatively attached to the pump  
5 and having a fluid passageway therein in fluid  
communication with the pump;  
a second connector attached to the air mattress  
and having a fluid passageway therein in fluid  
communication with an interior of the mattress, said  
10 second connector being configured for connection to said  
first connector;  
said second connector including a facilitating  
portion which in cooperation with the air pump and first  
connector facilitates inflation of the air mattress by  
15 the pump when said first and second connectors are  
connected together for the first time;  
said first connector including a disabling portion  
configured for engaging said facilitating portion during  
disconnection of the second connector from the first  
20 connector;  
said first and second connectors being configured  
such that engagement of the facilitating portion by the  
disabling portion during disconnection of the second  
connector from the first connector renders the  
25 facilitating portion inoperable so that said air mattress  
is capable of operable connection to said air pump for  
only a single use.

9. The programmable air mattress system of Claim  
7 wherein said facilitating portion comprises a  
mechanical actuator and wherein said mechanical actuator  
is physically rendered inoperable upon separation of said  
5 first and second connectors to thereby prevent operable  
re-connection of said first and second connectors.

10. The programmable air mattress system of Claim  
9 wherein said first connector further comprises an  
electrical switch electrically connected to said pump,

and said mechanical actuator being configured for  
5 actuating said electrical switch upon connection of said  
first and second connectors.

12. The programmable air mattress system of Claim  
7 further comprising a mechanical interlock to securely  
fasten said second connector to said first connector.

13. The programmable air mattress system of Claim  
12 wherein said mechanical interlock comprises a bayonet  
fastener.

14. The programmable air mattress system of Claim  
10 wherein each of said first and second connectors  
includes an aperture, the aperture of said first  
connector aligning with the aperture of said second  
5 connector when the first and second connectors are  
connected together.

15. The programmable air mattress system of Claim  
14 wherein said mechanical actuator includes a spring  
loaded pin extending through the aperture of said second  
connector.

16. The programmable air mattress system of Claim  
15 wherein said first connector includes a ramp for  
depressing said spring loaded pin as said second  
connector is connected to said first connector.

17. The programmable air mattress system of Claim  
16 wherein said electrical switch is aligned with the  
aperture of said first connector so that as said  
apertures become aligned by connecting said second  
5 connector to said first connector, said spring loaded pin  
extends through said aligned apertures to actuate said  
electrical switch.

18. The programmable air mattress system of Claim  
17 wherein said disabling portion defines the aperture of  
said first connector, said pin being configured to extend  
sufficiently into the aperture of said first connector  
5 when said first and second connectors are connected

together to thereby mechanically interfere with disconnection of said single use connector.

19. A ventilating air mattress for use in a bed system, said bed system comprising an air pump and a first connector operatively attached to the pump and having a fluid passageway therein in fluid communication 5 with the pump, said air mattress comprising:

an inflatable mattress body;  
a single use connector attached to the mattress body and having a fluid passageway therein in fluid communication with an interior of the mattress, said 10 single use connector being configured for connection to said first connector of the bed system, said single use connector including a facilitating portion which in cooperation with the air pump and first connector facilitates inflation of the mattress body by the pump 15 when said single use connector is connected to the first connector, said facilitating portion being configured for engaging a disabling portion of the first connector, said single use connector being configured such that engagement of the facilitating portion by the disabling 20 portion during disconnection of the single use connector from the first connector renders the facilitating portion inoperable so that said air mattress is capable of operable connection to said bed system for only a single use.

20. The ventilating air mattress of Claim 19 wherein said facilitating portion includes a mechanical actuator and wherein disconnection of said single use connector from the first connector of said bed system 5 physically renders said mechanical actuator inoperable.

21. The ventilating air mattress of Claim 19 wherein said single use connector further comprises a mechanical interlock to securely fasten said single use connector to said first connector of said bed system.

AMENDED SHEET (ARTICLE 19)

22. The ventilating air mattress of Claim 19 wherein said single use connector is securely fastened to said first connector by a bayonet fastener.

23. The ventilating air mattress of Claim 20 wherein said mechanical actuator includes a spring loaded pin extending through an aperture in said single use connector.

24. A method of limiting the inflation of an air mattress within a bed system to a predetermined time, the method comprising the steps of:

5 connecting said mattress to an air pump;  
inflating said mattress with the air pump;  
deactivating said pump at the predetermined time;  
and

inhibiting reactivation of the pump until after disconnection of the mattress from the air pump.

25. The method according to Claim 24 further comprising the steps of deflating said mattress and of disabling the mattress so that the mattress cannot be re-inflated by the pump after said predetermined time.

26. The method according to Claim 24 wherein the pump includes a switch moveable between a first position to enable activation of the pump and a second position to disable activation of the pump, the step of connecting 5 the mattress to the pump causing the switch to be moved to its first position.

27. The method according to Claim 26 wherein the mattress includes a frangible switch actuator which forces the switch to its first position when the mattress is connected to the pump, the method further comprising 5 the step of breaking the switch actuator to prevent it from moving the switch from the second position to the first position.

28. The method according to Claim 26 further comprising the step of moving the switch to its second position by disconnecting the mattress from the pump.

AMENDED SHEET (ARTICLE 19)

29. The method according to claim 28 further comprising the subsequent step of moving the switch to its first position by connecting another air mattress to the pump.

30. The method according to Claim 24 wherein the step of inhibiting reactivation of the pump further comprises inhibiting reactivation of the pump until after another mattress is connected to the pump.

31. A method of operating a bed system having an air pump and a first connector in fluid communication with the air pump, the method comprising the steps of:

providing a first air mattress assembly having an 5 air mattress and a mattress connector attached to the air mattress, said mattress connector having a fluid passageway therein in fluid communication with an interior of the air mattress;

connecting the mattress connector of the first air 10 mattress assembly to the first connector;

inflating the mattress of the first mattress assembly with the air pump;

disabling the mattress connector of the first mattress assembly so that it cannot be operably 15 reconnected to the connector for reinflation of the mattress by the air pump;

disconnecting the first mattress assembly from the connector; and

connecting a second air mattress assembly to the 20 connector.

32. The method according to claim 31 wherein the disabling step and disconnecting step are simultaneously performed.

33. The method according to claim 32 wherein the disabling step is performed the first time the disconnecting step is performed.

34. The method according to claim 31 further comprising the step of maintaining connection of the

AMENDED SHEET (ARTICLE 19)

first mattress assembly to the first connector of the bed system during use of the first mattress assembly by a patient.

35. The method according to claim 31 further comprising the steps of:

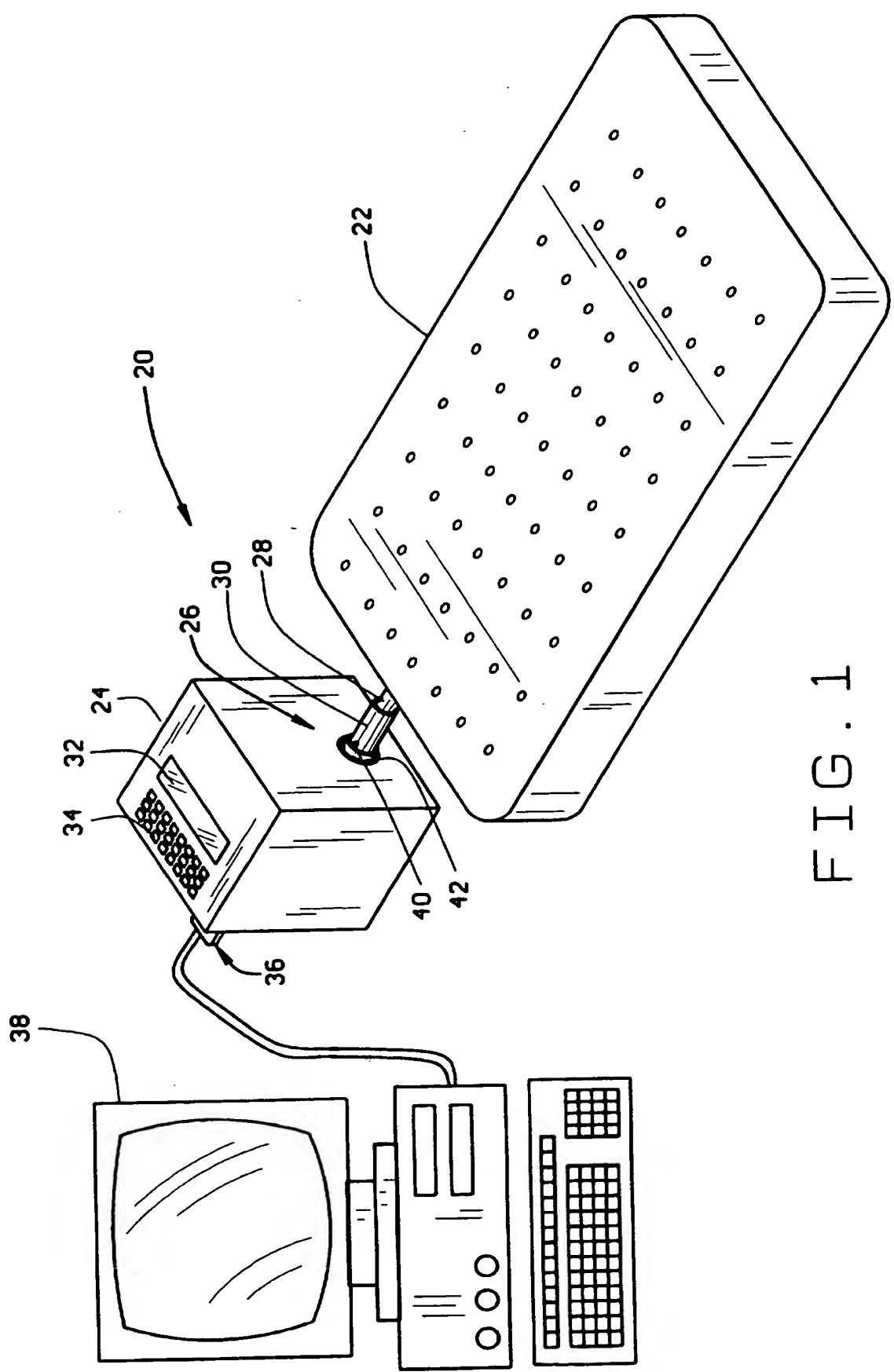
deactivating said pump a predetermined time after inflation of the first air mattress; and

5 inhibiting reactivation of the pump until after connection of the second mattress assembly to the first connector of the bed system.

STATEMENT UNDER ARTICLE 19

The claims of this application are amended into conformance with U.S. Application Serial No. 08/338,681 upon which priority is based. No new subject matter has been added. Replacement pages 11-17 are enclosed herewith setting forth the claims as amended. Entry of these amended claims into the application prior to publication is requested.

1/4



2/4

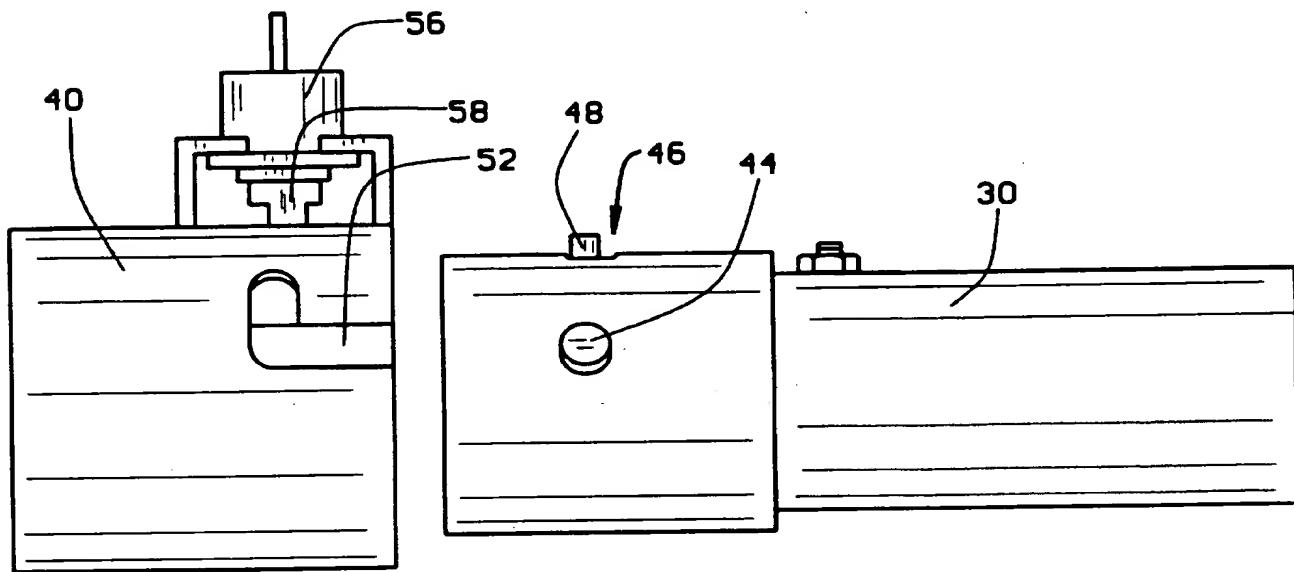


FIG. 2

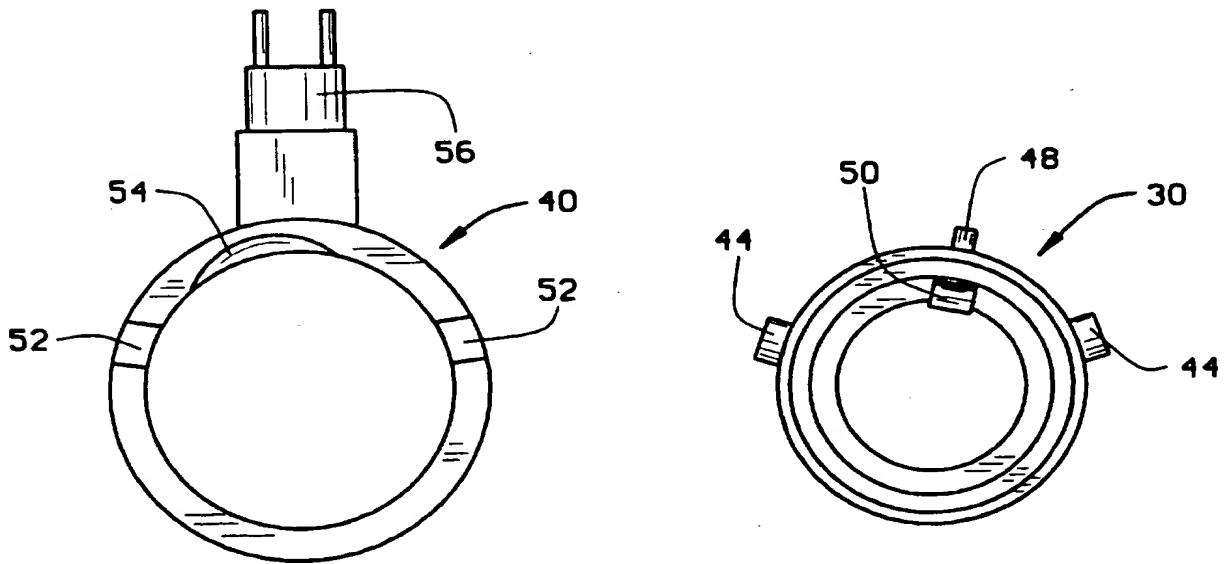
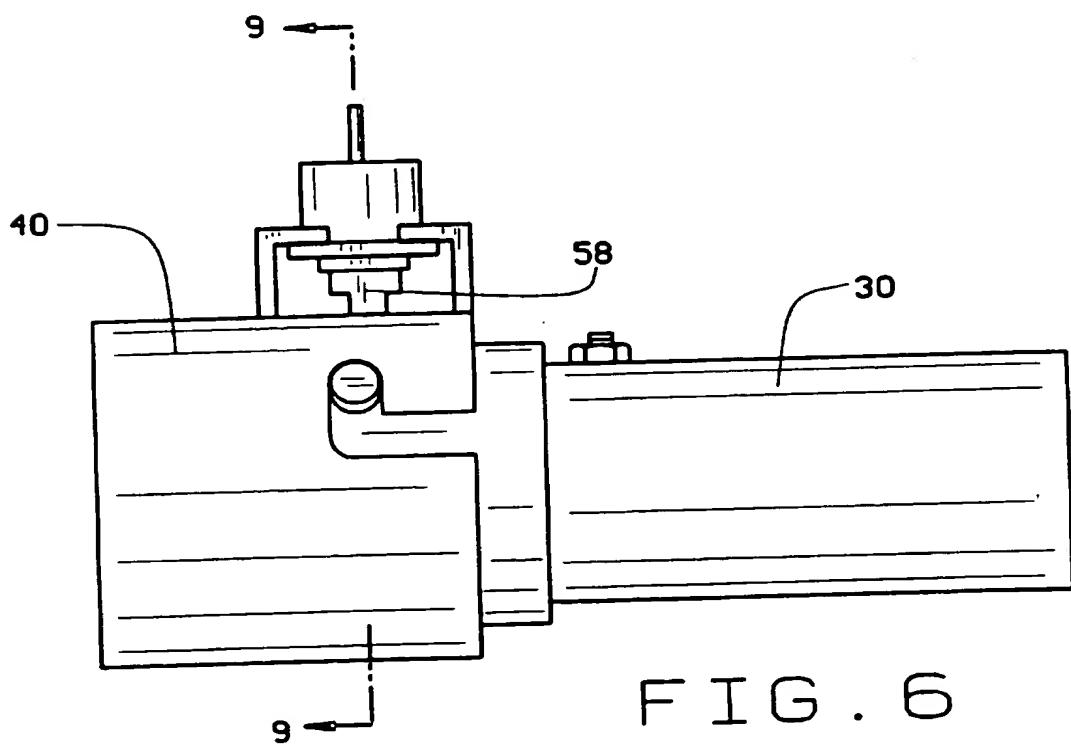
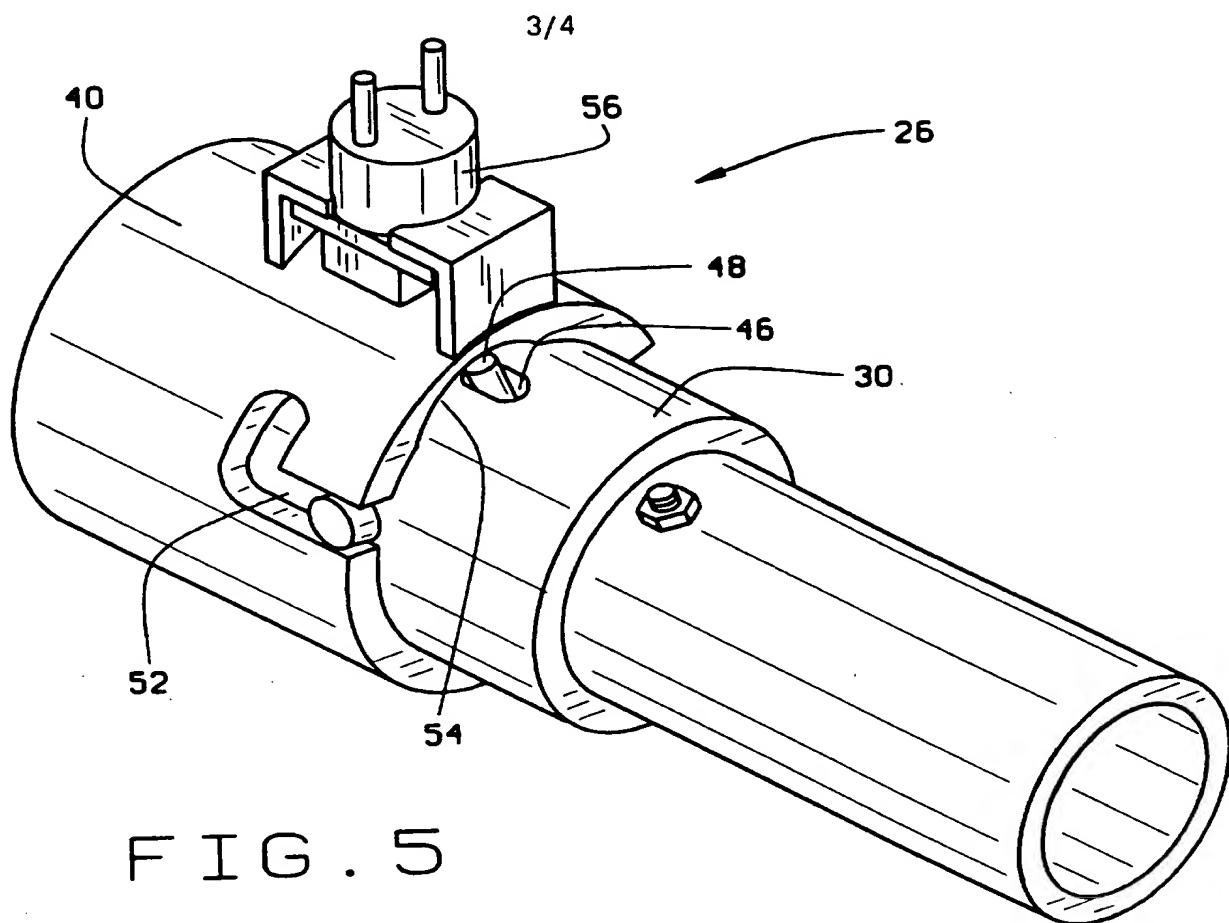


FIG. 3

FIG. 4



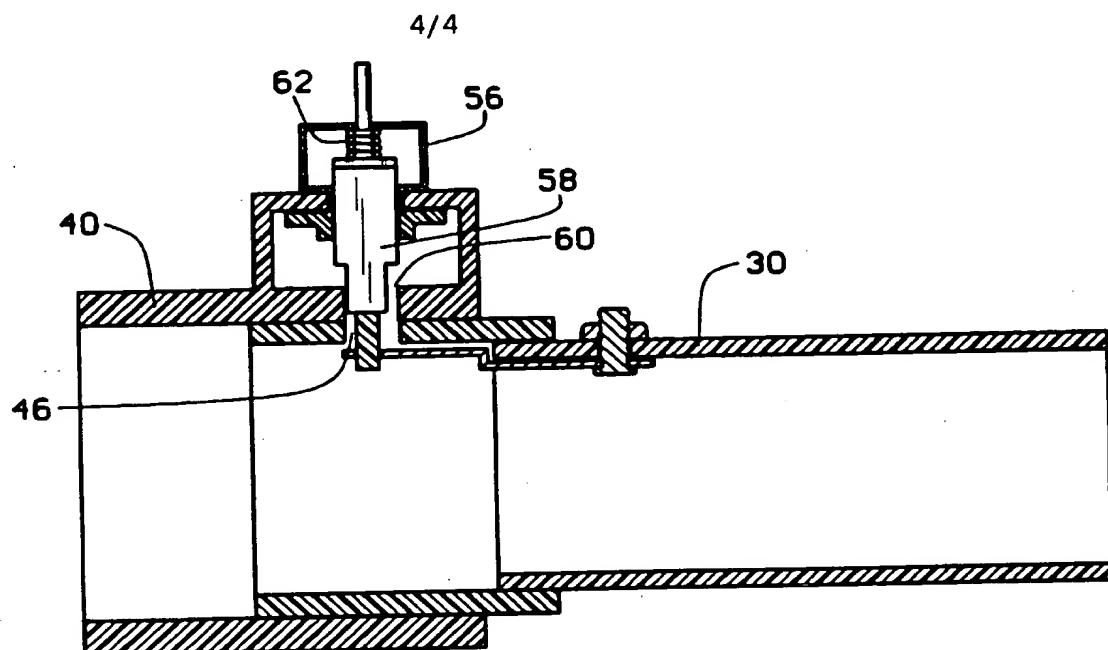


FIG. 7

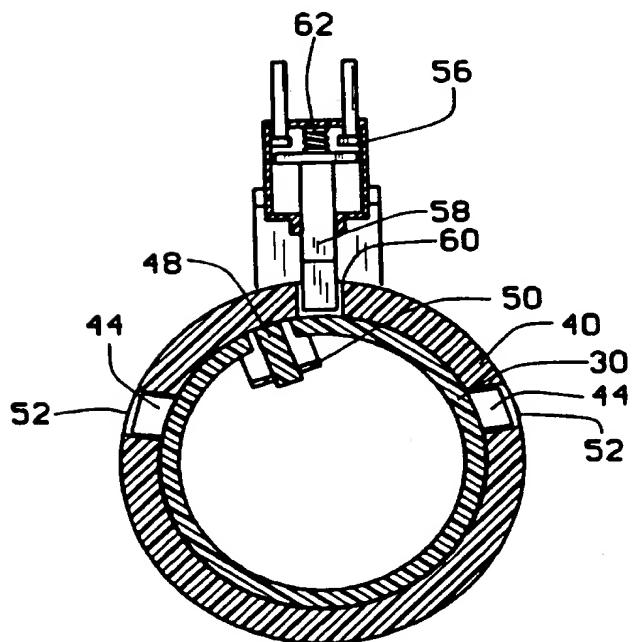


FIG. 8

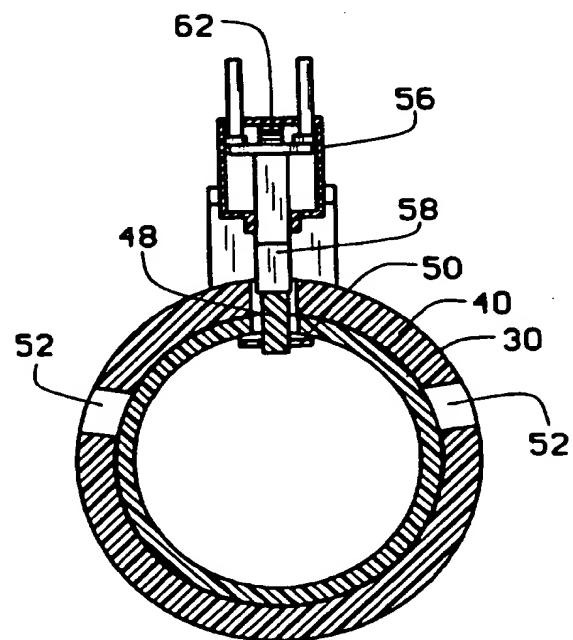


FIG. 9

## INTERNATIONAL SEARCH REPORT

International Application No.  
PCT/US95/14835

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : A47C 27/08  
US CL : 5/453, 449, 423

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 5/453, 449, 423, 455, 456, 461, 463, 468, 469; 403/2, 349, 27; 285/3, 93, 396, 402

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A 4,864,671 (EVANS) 12 September 1989, col. 2 lines 45-63, col. 3 lines 61-63.	1-3, 7, 19, and 24-26
---		----
Y		4-6, 8-9, 20-22
Y	US, A, 4,473,923 (NERONI ET AL) 02 October 1984, fig. 1-2 and 4.	4-6, 7-9, 20-22
Y	US, A, 5,145,213 (MARRISON ET AL) 08 September 1992, col. 4-5 lines 62-10.	5, 7, 9, and 20
Y	US, A, 4,779,608 (SMITH) 25 October 1988, fig. 4.	22

 Further documents are listed in the continuation of Box C.  See patent family annex.

Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier document published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search  
03 JANUARY 1996Date of mailing of the international search report  
06 MAR 1996Name and mailing address of the ISA/US  
Commissioner of Patents and Trademarks  
Box PCT  
Washington, D.C. 20231  
Facsimile No. (703) 305-3230Authorized officer *FREDRICK C. CONLEY*  
Telephone No. (703) 308-3868

**THIS PAGE BLANK (USPTO)**